June 2, 1969

Dr. Louis S. Jaffe
Physical Science Administrator
Department of Health, Education, and Welfare
National Air Pollution Control Administration
411 West Chapel Hill Street
Durham, North Carolina 27701

Dear Dr. Jaffe:

Thank you for your recent letter of May 20, 1969, inquiring about a calculated estimate of the mean residence time based on your figure of CO production and our data on C^{14} content of atmospheric CO.

Actually, given the concentration of CO and its rate of production we can calculate its mean life without recourse to the C^{14} specific activity. If we assume the CO concentration to be 0.1 ppm this means there is 0.1 mg CO/cm^2 of the earth surface. Your estimate of the rate of production of CO, 2×10^9 tons/year, works out to $\frac{2 \times 10^{17}}{5 \times 10^{18}}$ mg CO/year-cm^2 earth surface = 0.04 mg/cm^2 year. Dividing this into the inventory of 0.1 mg/cm^2 we get τ = 2.5 years.

From the value of the specific activity obtained by us, and again assuming a CO concentration of 0.1 ppm, we can use the formulae given in our papers to obtain an independent value of This turns out to be much smaller, $\tau \approx 4 \times 10^{-2}$ years. However, this value is certainly low because the CO concentration of the air from which the CO was collected is much higher than 0.1 ppm. It is in the range 0.3 - 1 ppm and might be even higher. τ would accordingly be 0.1 - 0.4 years, or possibly higher. I have no explanation for the remaining discrepancy - there could be a number of reasons for this.

I hope that this may be of some use to you.

Sincerely yours,

Richard Wolfgang

RW:b